BEFORE THE OHIO POWER SITING BOARD ED COCKETING DIV

2011 SEP -8 PM 4:55

In the Matter of the Application) of Black Fork Wind Energy, LLC for) a Certificate to Install Numerous) Electricity Generating Wind Turbines in) Crawford and Richland Counties, Ohio)

우 나 C O Case No. 10-2865-EL-BGN

DIRECT TESTIMONY OF JAY HALEY

Q.1 Please state your name and business address.

A.1 My name is Jay Haley, PE, Partner, EAPC Wind Energy, 3100 Demers Avenue, Grand Forks, N.D. 58201.

Q.2 What are your duties as Partner at EAPC?

A.2 I am a Managing Partner. I am responsible for all activities related to the wind energy group.

Q.3 What is your educational and professional background?

A.3 I have a Bachelors Degree in Mechanical Engineering from the University of North Dakota. I was the Director of Engineering and New Product Development for an aerospace company for 5 years, an energy research engineer for 10 years which involved wind energy research, and have spent the last 13 years as a consultant in the wind energy sector. My company represents the WindPRO software that was used to calculate the shadow flicker. We are the North and South American Sales and Support Agents for WindPRO. We use the software every day in our own consulting work and we teach more than 100 engineers and technical persons every year on how to use the software. With regard to experience specifically relevant to this project, we have performed more

This is to certify that the images appearing are at accurate and complete reproduction of a case file locument delivered in the regular course of business rechnician ______ Date Processed _______ SEP_0.8.2011 than 100 shadow flicker studies all over the United States. We most recently consulted for enXco on the 150 MW Merricourt wind farm permitting process in North Dakota. I provided shadow flicker and noise studies for the project and testified on the results of the studies during the public hearings.

Q.4 On whose behalf are you offering testimony?

A.4 I am testifying on behalf of the Applicant in this proceeding, Black Fork Wind Energy, LLC.

Q.5 What is the purpose of your testimony?

A.5 The purpose of my testimony is to describe the shadow flicker studies I and my firm, EAPC Wind Energy, performed on behalf of the Applicant. I am also providing general testimony on shadow flicker mitigation. Lastly, I will address some of Staff's recommended conditions.

Q.6 Please describe the studies that you and your firm undertook on behalf of the Applicant.

A.6 We performed calculations to determine the shadow flicker impacts on 604 occupied residences within the vicinity of the wind farm for three different wind turbine models. Our report summarizing the results of our analysis is included as Appendix N in the Application. We also performed visual simulations.

Q.7 Did you and your firm perform any additional studies other than those summarized in the Application?

A.7 Yes. We performed more detailed studies on the 17 non-participating residences that were predicted – based on the initial model runs - to experience more than 30 hours of flicker per year if the Vestas V100 turbine was used for the project. Our more detailed

studies determined that only 11 of the 17 non-participating residences would likely, experience more than 30 hours per year of shadow flicker.

Q.8 Have you reviewed the Staff Report issued in this proceeding?

A.8 Yes.

Q.9 At page 35 of the Staff Report, the Staff makes reference to 17 nonparticipating residences that exceed 30 hours of shadow flicker per year. Can you describe what steps can be taken to reduce the amount of shadow flicker at those residences to no more than 30 hours per year?

A.9 As I indicated above, further analysis of the 17 nonparticipating residences shows that only 11 are predicted to exceed the 30 hour per year threshold. The reduction in anticipated non-participating residential impacts from the more detailed analysis is due to the use of the more accurate, directional flicker sensors to represent each of the four sides of the building, instead of the greenhouse sensors, which record flicker from all directions at once, as if placed on the roof of the building. Steps that could be taken to reduce the impacts of shadow flicker at the 11 non-participating residences where we anticipate shadow flicker could be to plant trees or add window blinds, or as a last resort, to curtail the wind turbine causing the flicker during the times of flicker when the sun is actually shining.

Q.10 In your experience, how does modeled shadow flicker correlate to actual shadow flicker post commercial operation?

A.10 The predictions of realistic shadow flicker hours per year are typically on the high end. When field verification is performed, the actual hours recorded are usually less than

3

predicted due to the actual variations in the number of hours of turbine operation and cloudy days.

Q.11 At page 61 of the Staff Report, Staff recommends two conditions (54 and 55). Do you agree with those conditions?

A.11 Yes. Condition 54 will be a follow-up to our second analysis in which we determined only 11 of the 17 non-participating residences will exceed the 30 hour per year threshold. Condition 55 imposes a mitigation requirement intended to address any non-participating residence projected to exceed 30 hours of shadow flicker before commercial operation commences. I only have one recommended clarification to the conditions, and that is to revise the first sentence of Condition 55 as follows: "That any turbine forecasted prior to construction to create in excess of 30 hours per year of shadow flicker at a non-participating *habitable residential* receptor within 1,000 meters shall be subject to further review and possible mitigation."

Q.12 Does this conclude your direct testimony?

A.12 Yes, it does.

<u>CERTIFICATE OF SERVICE</u>

I certify that a copy of the foregoing document was served by hand delivery upon John Jones and Stephen Reilly, Assistant Attorneys General, Public Utilities Section, 180 E. Broad Street, 6th Floor, Columbus, OH 43215 and via U.S. Mail upon the following persons listed below this 8th day of September 2011:

Debra Bauer and Bradley Bauer 7298 Remlinger Road Crestline, Ohio 44827-9775

Gary Biglin 5331 State Route 61 South Shelby, Ohio 44875

Karel A. Davis 6675 Champion Road Shelby, Ohio 44875

Carol and Loren Gledhill 7256 Remlinger Road Crestline, Ohio 44827-9775

Brett A. Heffner 3429 Stein Road Shelby, Ohio 44875

Ohio Farm Bureau Federation Chad A. Endsly 280 North High Street PO Box 182383 Columbus, Ohio 43218

Grover Reynolds 7179 Remlinger Road Crestline, Ohio 44827-9775 Margaret and Nick Rietschlin 4240 Baker Road Crestline, Ohio 44827-9775

Orla Collier III Benesch, Friedlander, Coplan & Arnoff LLP 41 South High Street, 26th Floor Columbus, Ohio 43215

Mary Studer 6716 Remlinger Road Crestline, Ohio 44827-9775

John Warrington 7040 SR 96 Tiro, Ohio 44887

Thomas Karbula 3026 Solinger Road Crestline, Ohio 44827-9775

Alan and Catherine Price 7956 Remlinger Road Crestline, Ohio 44827-9775

Michael J. Settineri